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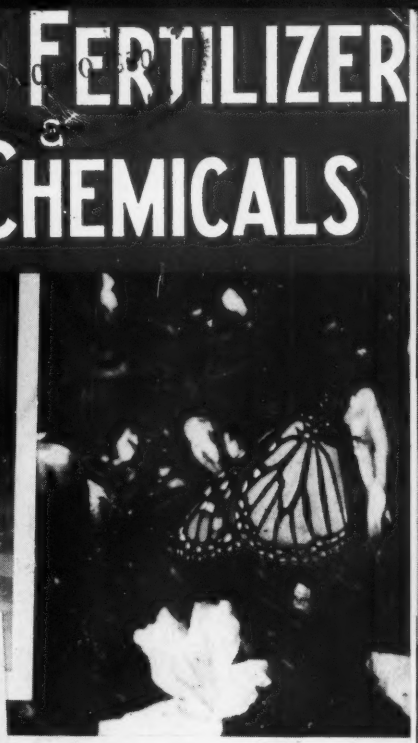
AMERICAN FERTILIZER & ALLIED CHEMICALS



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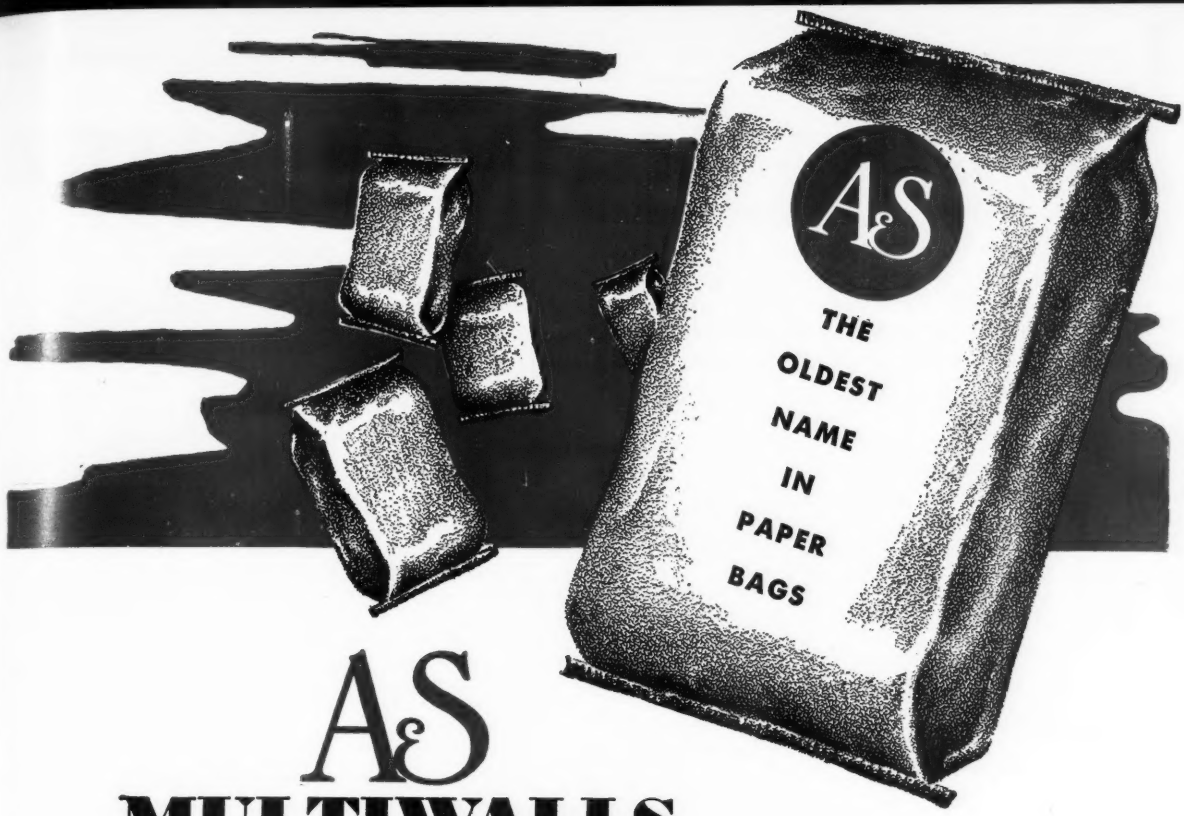

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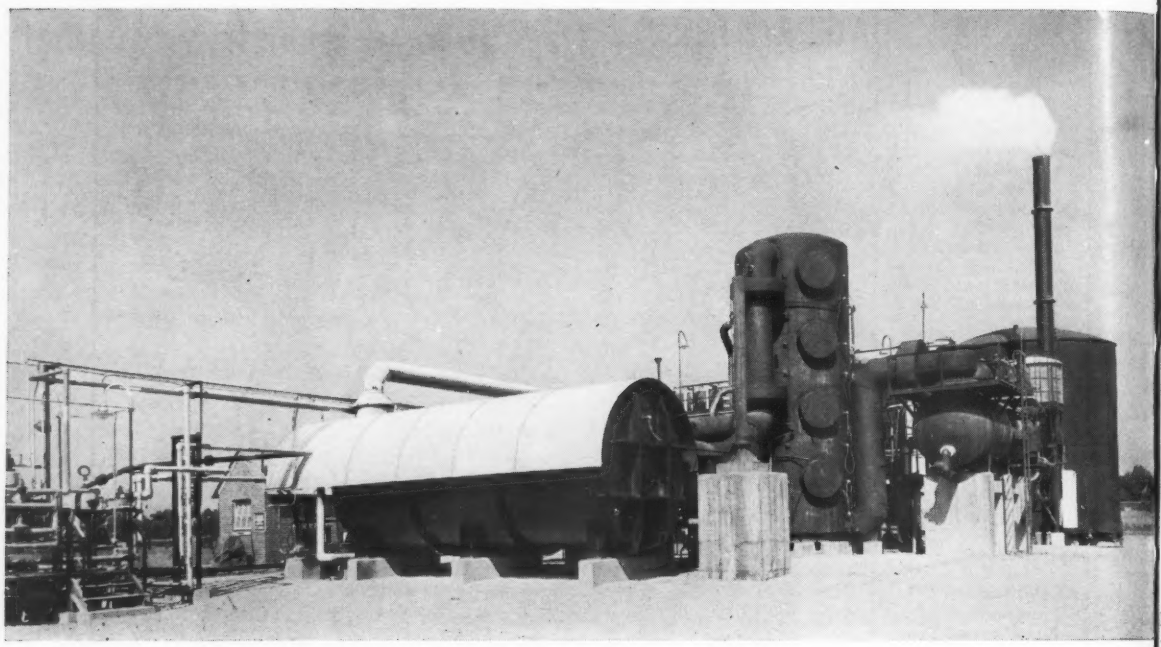

The first plant, utilizing Chemico's *new* process for making sulfuric acid from sulfur, is now in successful operation at the Hamilton, Ohio works of the American Cyanamid Company. This new unit—rated at 50 tons per day can deliver sulfuric acid of any strength up to 95% H_2SO_4.

This new-type Chemico plant is basically simpler than conventional type contact sulfuric acid plants. The new process differs in these basic ways.

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- Seven major items of equipment — usually found in present-type contact acid plants — have been eliminated: drying tower, gas filter, heat exchanger, SO_3 cooler, acid coolers, acid circulating and transfer pumps and diluting equipment.

THE RESULTS — The new-type plant is much smaller. It can be economically built and operated. Investment cost is lower per ton of capacity. Startup, shutdown and operation are easier. CC 207

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THE COVER: *Well planned meetings, a sporty golf course, a top-flight dance orchestra, butterflies among the azaleas—no wonder the industry came in hotel-overflowing numbers to the NFA Fall Meeting at Edgewater Park, Miss.*

The Industry's Worth to The Public

"The fertilizer industry benefits more people, directly or indirectly, than any other industry." That statment comes not from within the industry, but from a soils expert employed by one on the nation's largest independent canning companies.

To the scientist's employers, it doesn't matter whether this or that group purveys the source of the plant food which gives them the quality they demand in the crops they buy. What does matter to them is that the quality is there. It is. What's more, it's getting better. The same scientist who made the above quoted remark (*see NFA convention report, beginning page 6, this issue*) says that careful investigations conducted over a period of years show that commercial fertilizers are improving, not lowering, the quality of the food we eat.

The industry is concerned, not only with developing soils capable of producing abundant crops, but also with protecting them from destruction by pests and disease once they have begun to flourish. In recent years, great strides have been made by the entomologists and the chemical industries in producing effective pest-control chemicals..

In spite of its valuable contribution to the nation's bread-basket, the farm chemicals industry is beset on all sides by forces that would stifle it out of existence. Pseudo-scientific cults would have the public believe that fertilizers are ruining the nation's health; that weeds can be eradicated by turning geese into the garden. The fact that without commercial fertilizers many of our most productive lands would be barren isn't part of the story the cultists have to tell. The number of geese, selective as their taste may be, that would be required to control Johnson grass in, say, the state of Ohio, is left for the public to ponder.

Congress is presently under pressure from several groups to make drastic changes in laws controlling the use of chemicals in the production of foodstuffs. Many entomologists, however, including some top-flight men on the government's own payroll, feel that present laws are adequate. Dr. F. C. Bishopp, of the Bureau of Entomology and Plant Quarantine, believes "additional legislation has distinct adverse potentialities."

As the government busily investigates one aspect of the farm chemicals industry, it is busy expanding its own participation in another. According to J. E. Totman, chairman of the board of directors of the NFA, federal legislation is now being proposed which will, if passed, put the government further into the fertilizer business.

Confronted as it is with such confusion, nonsense, and needling, it would be understandable if the farm chemicals industry struck out in self-defense with advertising, radio speeches, and television programs in a boyish effort to prove its own significance to the public. Instead, with characteristic maturity, it is going quietly about its work, constantly seeking to *im*prove its worth. No one will blame it, though, if it raises an eyebrow now and then.

NFA Holds Fall Meeting

By A. M. Brodine

WARM SUNSHINE and clear Southern skies escorted by invigorating breezes from the Gulf of Mexico accompanied the fall meeting of the National Fertilizer Association at the Edgewater Gulf Hotel, Edgewater Park, Miss.) Among the few remaining late-fall azalias, butterflies hovered busily and combined with the weather in what seemed an intentional effort to symbolize the quiet vigor that keynoted the three-day convention.

While there was relaxation and entertainment available on all sides, the 435 people who registered for the November 12–14 meeting, many of whom had come from as far away as Boston, Chicago, and New York, made it plain they were there on business. Attendance at the formal meetings was prompt and heavy.

In the corridors, in the semi-privacy of hotel rooms, in the lobby, and around dining tables, many of the conventioners gathered informally at all hours. So continuous and intent was the participation in these informal meetings and discussions that in them much of the real business of the convention must have been conducted.

One of the first official actions accomplished at the convention was taken Monday at the meeting of the Board of Directors. As announced the following day by James E. Totman, board chairman, a committee was appointed to represent the NFA in discussions of a suggested merger between the fertilizer industry's two associations, the American Plant Food Council and the NFA. Totman promised that NFA members would be kept informed as to any new developments in the negotiations.

Presiding as chairman of the general session at 10:00 A. M. Tuesday, Totman expressed his thanks for being chosen chairman of the Board. He then outlined what he called "Industry's Responsibilities in the Emergency."

Among the current problems discussed by Totman were recurrent efforts to put the government further into the fertilizer industry in competition with private enterprise, manpower needs arising out of the war in Korea, materials shortages likely to hamper the manufacture of fertilizer, and the need for rapid shipment of products from the factory to the farm because of the lack of storage space at most fertilizer plants. (*The complete text of Mr. Totman's speech is given in this issue, beginning on page 11*).

Norris E. Dodd, director-general of the United Nation's Food and Agricultural Organization was to have addressed the convention on "The World Food Outlook," but was called away for an emergency meeting of the group which he heads.

In a talk, "Beyond The Food Horizon," illustrated by graphs and color slides, Dr. Jackson B. Hester, soils technologist for the Campbell Soup Company, said "the fertilizer industry benefits more people, directly or indirectly, than any other industry." Among those who benefit, Hester said, are chemists, manufacturers, transportation companies, and the U. S. Department of Agriculture; as well as all those who eat food enriched by growth in properly maintained soils.

Hester showed graphic proof of the part played by fertilizers in producing high-quality foodstuffs. In one example, he showed pictures of a variety of peas grown in Canada, which could not be cooked even after 24-hours of boiling. The difficulty was traced to an over-abundance of calcium carbonate in the soil and after this condition was overcome and the mineral content of the soil balanced, peas grown there could be cooked in the normal way.

World Peace

An eloquent plea for a workable world peace was voiced by Dr. Robert Lee Humber, former Rhodes scholar, now a world traveler and student of international affairs. He called for a world government, implemented by international laws applicable to individuals rather than entire nations, presided over by a world court and enforced by a powerful international police force. Diplomacy, maintained Humber, fails to achieve peace because when faced with a crisis it has only two alternatives. It can either go to war to stop an aggressive act or appease the aggressor. In either

BUSINESS AND PLEASURE AT THE NFA FALL CONVENTION

1. Seated: H. E. Wood, Farmers Fertilizer Co.; Mrs. H. E. Wood; T. E. Bradley, Potash Co. of America; Mrs. T. E. Bradley; J. E. Powell, Smith Agr'l Chemical Co.; W. F. Nesbitt, Arkell & Smiths; Mrs. T. S. Whitsel; T. S. Whitsel, Union Special Machine Co.; Standing: N. T. White, Smith Agr'l Chemical; T. L. Jones, Arkell & Smiths. 2. Jackson B. Hester, Campbell Soup Co. 3. C. D. Shallenberger, Shreveport Fertilizer Works; Mrs. Eloise Nelson, International Minerals; W. S. Ritnour and D. S. Murph, NFA. 4. President Coleman (left) discussing convention doings; 5 Ray King, former NFA Chairman, (left) receives silver platter from President Russell Coleman and present NFA Chairman J. E. Totman. 6. G. S. McIntosh, TVA; J. E. Nunnally, Cotton Producers Assn. 7. The St. Regis delegation: Jim Weldon, H. S. Rhodes, C. A. Woodcock, C. C. Keefer. 8. President Coleman, Mrs. Louis Ware, J. E. Totman, Summers Fertilizer Co., Louis Ware, International Minerals; Mrs. J. E. Totman. 9. Fred S. Lodge, NFA; H. B. Mann, American Potash Institute

case, Humber pointed out, the cause of peace is lost. Under the system Humber proposed, aggression could be stopped without resorting to a war because the proposed world government would have jurisdiction over the individuals responsible. This principle of individual responsibility is already in operation at state and national levels, but not at international levels. The means by which such a system could be attained are already at hand, said Humber, in article 109 of the United Nation's Charter, and actions taken under it by the General Assembly cannot be vetoed. Humber closed by declaring that the final answer is in the hands of individuals such as those who attended the convention.

High vs. Low

Final meeting of the convention was given over to a panel discussion on the relative merits of high- versus low-analysis fertilizers. Russell Coleman, president of NFA, introduced the panel discussion and said it was a first step in bringing together representatives of the industry, university workers, state control officials, and agriculturalists for discussion of mutual problems. The panel, moderated by J. F. Fudge, State Chemist, College Station, Tex., was made up of Ivan E. Miles, Extension Agronomist, State College, Miss.; Maurice Lockwood, Vice-President, Plant Food Division, International Minerals & Chemicals Corporation, Chicago, Ill.; H. L. Dunton, head of the Department of Agronomy, Virginia Polytechnic Institute, Blacksburg, Va.; and A. F. Miller, General Manager, Plant Food Division, Swift & Company, Chicago, Ill.

Mr. Fudge started the discussion by outlining the present trend toward higher analysis fertilizers. He stressed that there is a wide difference of opinion as to what is meant by "high" and "low."

"Statistical trends of recent years" were discussed by Mr. Miles who presented a wealth of data in the form of slides. His statistics, many of which he credited to the American Society of Agronomy, showed the comparative uses of various fertilizer ratios over the last three and four years.

The most used fertilizer ratio for the entire United States was given as 2–12–6. Confining most of his presentation to fertilizers used in the Southeastern section of the United States, Miles showed that in 1948 the 10 top grades used in that locality were: (1) 3–9–6; (2) 4–10–6; (3) 5–10–5; (4) 4–8–6; (5) 3–12–6; (6) 4–10–7; (7) 4–12–4; (8) 6–8–6; (9) 3–9–9; (10) 4–8–8.

There has been a 300 per cent increase in the consumption of fertilizer in Mississippi during the last ten years. Stated another way, in terms of total consumption the ratios used were, 56 per cent nitrogen, 30 per cent P_2O_5, and 20 per cent potash.

Miles interpreted this to mean that a considerably small number of fertilizers could be offered by the producers. Commenting on results farmers get from the use of fertilizers, Miles said that for each dollar invested in fertilizer, the farmer produces from $4.42 to $16.00 worth of crop, depending upon what he raises. Miles said that the Southwest uses 700 grades of fertilizers while 15, he believes, would suffice. Narrowing ratios down to a 1–1–1 are gaining in favor, Miles concluded.

In discussing the points in favor of high-analysis fertilizers, Mr. Lockwood turned to economics to support his arguments. He said that the availability of increasing quantities of inorganic nitrogen at decreasing costs have promoted the trend to higher-analysis mixtures. An increase during the last 10 years of around 70 per cent in cost of transportation has reduced (in terms of units of plant food shipped,) the cost of of moving high-analysis fertilizers. In the last ten years there has been an increase of about 100 per cent in the cost of labor. This has led to the adoption of more machinery and a reduction in man-hours while giving a better income to the man who is employed. Lockwood feels that while there has been a rapid change toward concentrated P_2O_5, superphosphates are not going to eradicate ordinary phosphorous. "We will go on and use the same amounts of high-analysis fertilizers," concluded Lockwood, "as we have standard mixtures in the past, not out of selfish interest for our own industry, but because the crops we now grow need them."

In favoring low-analysis fertilizers, Mr. Miller said, "I am against pushing this thing too far." He pointed out that his company has sold high-analysis fertilizers for over 20 years, but had abandoned them during the depression. Since World War II there has been an increase in the use of the lower grades, to almost full capacity of the producers.

One of the problems Miller sees in the manufacture of highly concentrated fertilizers is that there is no room for conditioners or fillers. Fillers can be done away with with-

(Continued on page 20)

HERE AND THERE AT EDGEWATER PARK

1. C. A. Woodcock, St. Regis; P. H. Clute, Agr'l Products Co.; Jim Weldon, St. Regis. 2. Panel members: Ivan E. Miles, Miss. State College; M. E. Lockwood, International Minerals; J. F. Fudge, State Chemist, Texas; H. L. Dunton, Va. Polytechnic Institute; A. F. Miller, Swift & Co. 3. John Carr, John Bennett, Ralph Allen and H. G. Brannon, American Cyanamid Co.; G. C. Kempson, Lion Oil Co.; R. P. Goggans, American Cyanamid; Shelton Appleton, Lion Oil. 4. W. S. Dennis, International Minerals; J. E. Adams, Texas A. & M. College; D. D. Long, G. L. Boynton and H. H. Douthit, International Minerals. 5. Robert Lee Humber. 6. Hugh Craig, Oil, Paint & Drug Reporter; D. S. Murph, NFA; J. C. Molony (back to camera), Molony Fertilizer Co.; R. A. Oliphant, Victor Fertilizer Co. 7. J. E. Nunnally, Cotton Producers Assn.; L. G. Porter, U.S.D.A.; J. E. Totman, Summers Fertilizer Co.; Sidney Wald, NFA. 8. Sid Keel, International Minerals; W. Gedge Gayle, Kelly, Weber & Co.; T. E. Bradley, Potash Co. of America; W. S. Dennis, International Minerals; M. S. Hodgson, Hodgson's Inc.; G. L. Boynton, International Minerals; Weller Noble, Pacific Guano Co.; H. A. C. Rauchfuss, Woodward & Dickerson; G. V. Savitz, International Minerals. 9. The Totman family: Mr. and Mrs. James E. Totman, Mrs. and Mrs. James C. Totman

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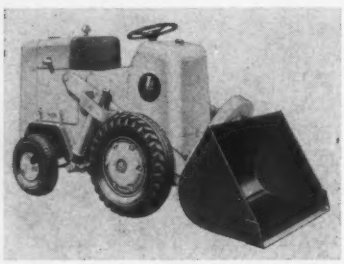
Detailed dimensions, weights, and other engineering layout data are given, including a page on how to select the right size of screen for handling a given capacity of material per hour over square openings of up to three inches.

Improved Payloader Tractor-Shovel



The Frank G. Hough Company announces production of their new, improved Model HA Payloader. This small, compact 12 cu. ft. tractor-shovel has many friends in fertilizer plants, foundries, and processing and manufacturing plants where bulk materials must be unloaded from box cars and materials must be moved inside and outside of buildings.

The new improved Model HA should prove even more popular because it is a faster, more rugged and more powerful machine. A new higher compression engine gives more power and economy; the clutch is larger; operator's compartment is roomier and more comfortable; steering gear and linkage is more rugged; main frame is stronger; a constant mesh transmission insures faster, quieter operation; maintenance operations are simplified by greater accessibility of engine and other parts.

Those familiar with the outstanding performance, economy and durability of the Model HA can fully appreciate the kind of service the new improved Model will render.

Further detailed information about this economical and versatile bulk material handler can be obtained from the manufacturer, 704A Sunnyside Avenue, Libertyville, Ill.

NFA Receives Public Relations Award

For "an unusually comprehensive program with a large element of public service" The National Fertilizer Association has been presented with the 1950 top award in the field of agriculture by the American Public Relations Association. The award—a trophy bearing a silver anvil, the emblem of the organization—was given to NFA at a special meeting attended by several hundred persons held in Washington, November 14. The occasion was the leading feature of the annual meeting of America's national public relations group.

The APRA Award is the second to be made to The National Fertilizer Association in as many months. In September the organization was presented with an Award of Merit by the American Trade Association Executives at their annual convention in Boston.

Howard Bonham, vice president of the American Red Cross and chairman of the Judges Committee of the APRA, made the following statement in presenting the trophy: "This award is given for an unusually comprehensive program with a large element of public service and a striking use of graphic material. The broad program has been based mainly on educational assistance to farmers, organizations and schools with all phases well integrated to give the greatest amount of good will. This program, every step of which clearly demonstrates a keen knowledge of public relations, resulted in the execution by all its members of a comprehensive public relations performance."

ARPA Trophy

Members of the distinguished Judges Committee who served with Mr. Bonham: E. Huber Ulrich, Assistant to the President, Curtis Publishing Company, Philadelphia, Pa.; Keen Johnson, Vice President and Director of Public Relations, Reynolds Metals Company, Louisville, Ky.; Ralph Delahaye Paine, Jr., Managing Editor, **Fortune Magazine,** New York City; J. L. Kaufman, Public Relations Consultant, Hollywood, Calif.; Boyce Morgan, President, Boyce Morgan and Associates, Washington, D. C.; Dean Dinwoodey, President, Bureau of National Affairs, Inc., Washington, D. C.; B. C. Forbes, Publisher, Forbes Magazine, New York City; Dr. Cloyd Heck Marvin, President, George Washington University, Washington, D. C.; and Graham Patterson, Publisher, **Farm Journal** and **Pathfinder** Magazines, Philadelphia, Pa.

Industry's Responsibility in the Emergency*

By J. E. Totman

Chairman, of the Board of Directors, The National Fertilizer Association

You and I are living in an age of startling changes—I almost said "upheavals"—in social, economic and political life, national and international, and he would be a hardy man indeed who would attempt to predict today the eventualities of tomorrow. Such a condition calls for alertness, diligence and preparedness on the part of our industry to meet whatever of difficulties or demands may confront us. I recognize the responsibility to NFA and its members and to the public which has been laid upon me under these circumstances. I accept it with humility knowing that I will have your sympathetic understanding and cooperation, without which no effort of mine would be worth the making.

It seems to me that there are some long-term, over-all objectives for the fertilizer industry to which we must adhere at all times and under all circumstances. Conditions may on occasion obscure temporarily their importance or may for the moment divert the emphasis of our energies to other phases of our business. But we must never lose our grip on the fundamentals—they are basic in our business life.

The "public-be-damned" attitude, which noticeably for a time in many industries, though not in fertilizers, characterized business management, is now in the past—and rightly so. Any industry which purports to be a major factor in the economic life of today must prove its worth. And, to *prove* its worth it must *make* its worth. All of which is another way of saying that it must do a good job from the standpoint of the public.

To realize the useful and necessary place of the fertilizer industry in the national economy, we need only remind ourselves that more than one-fifth of the total farm production of this country is due to the use of fertilizer. Beyond that, fertilizers have maintained the productive ability of millions of acres of land which otherwise would be a totally negative asset to our country. The purpose and nature of our product have thus insured it a place among the necessities of an increasingly complex civilization—a civilization which is finding substitutes for manpower all along the line.

Steps to Further Progress

To maintain this favored position and to realize all its potentialities, we must, among other things:

First: Learn to make better fertilizers, and to make and deliver them to farmers at the lowest possible cost.

Second: Learn what fertilizers to use and how to use them, with respect to soils and crops, in order that they may bring the maximum returns in production.

Third: Find new fields of usefulness and hence new markets for fertilizers—this includes new fertilizer areas and new uses in older areas.

Fourth: Promote such use of fertilizers as will help to restore to our soils the plant nutrients removed or lost from them.

Fifth: Convince fertilizer users, and keep them convinced, that the money they spend for fertilizers is a sound investment.

The key to these objectives is FACTS. Some one has defined science as "organized knowledge." Some one else has defined it as "applied common sense." I think both are right. Science is a combination of knowledge and common sense.

In trying to achieve our objectives we must first have irrefutable knowledge. We cannot afford to proceed upon assumptions; and we must be absolutely sure of our facts. The facts about fertilizers are being and can be secured only by the most painstaking and patient research.

Existing agencies and means for such research include soil and fertilizer scientists of the United States Department of Agriculture, State agricultural experiment stations, State agricultural colleges, industry researchers and organizations, and special studies through fellowships in colleges and universities. It is doubtful whether any other industry has such an array of independent, impartial sponsors as has the fertilizer industry. We have at hand and in the making a vast store of knowledge acquired and available to us through the efforts of men who are merely seeking the truth, let the chips fall where they may.

Frank discussion between administrative and scientific officials, representing agriculture and the public, and members of the industry will result in better understanding and more satisfactory solution of mutual problems. NFA sponsors such meetings and discussions in various areas of the country and is proud to observe the beneficial results. Tomorrow's program is an illustration of this type of cooperation. Agronomists from the southeastern States have been invited to the convention and will help us to carry the ball.

Accomplished and potential knowledge as to the what, where, when and how of fertilizer usage is, to a great extent, ours for the asking. Our job is to fill in whatever gaps may exist, to integrate all the facts into a well-rounded picture which will reflect the scientific, the

*Address at the 24th annual fall meeting of the National Fertilizer Association, Edgewater Gulf Hotel, Edgewater Park, Mississippi, November 14, 1950.

practical, and the business aspects of fertilizer use, and to present that picture to actual and potential users of fertilizer and to the general public. Only so can we attain and maintain that place in the sun which the fertilizer industry, from its past achievements and its inherent possibilities, so well deserves.

Such has been through the years and is now the permanent goal of your Association. And so essential seems that goal that your Board of Directors, at its June meeting, decided to set up an Association agency having as its special purpose the continued and more intensive and more systematized development of agricultural research and educational work related to fertilizers, soils and crops. That purpose is clearly indicated in the name of the organization, the "NFA Plant Food Educational and Research Foundation." This plan affords an opportunity to persons in the industry, notably producers of materials, who have a primary interest in such work to coordinate their background efforts with those of others having similar interests.

Meeting Current Problems

As has been indicated, it is our permanent, over-all purpose to promote the sound use of fertilizer—which necessarily includes both acquisition and distribution of factual data. However, conditions frequently present current problems which are of a more or less temporary or intermittent nature but which nevertheless are vital to our existence and functioning as an industry, and which must therefore be met intelligently and vigorously as they arise.

In this category would fall the recurrent efforts that have been made during the past six or eight years to put the Government further into the manufacture of fertilizer in competition with private industry. Such efforts have had powerful backing by certain groups and in certain schools of thought. Your Association has been on the job, along with individual members, in fighting this proposed legislation, and apparently for the moment at least, the danger from this threat has been somewhat reduced. It is an ever-present danger, however, which may become active at any time and all of us must be constantly on the alert to meet it.

A problem of this nature which is currently alive and cooking, so to speak, is the investigation, by a Select Committee of the House of Representatives, into the use of chemicals in foods, insecticides and fertilizers. NFA staff members have been in daily contact with this situation. Fertilizer will have its innings the first week in December, and prominent State experiment station officials and representatives of the fertilizer industry will express their views.

The present emergency caused by the war in Korea and the potential repercussions therefrom pose many problems for our industry. In connection with manpower, though our industry has been declared one of the "Essential Activities" by the Department of Commerce and most of our technical men have been listed on the "Critical Occupation List" of the Department of Labor, the Department of Defense has indicated that, as to reservists and National Guard members, such listings will be considered only in connection with temporary short-time deferments to premit the training of a substitute. No blanket deferments will be considered for any industry, we are told, and all cases will be considered individually. No corresponding releases have as yet been issued for Selective Service draftees but it is believed a similar course will be pursued. We must be prepared to operate our plants should key men subject to service be called. It will be necessary to have substitutes in training for such men. There is little chance that deferments of any kind longer than sixty days will be granted.

Sulphur Shortage

Our most serious supply situation hinges on sulphur. A recent study of the world sulphur situation indicates that current annual production is about 5.7 million tons and demand about 6 million tons. The North American continent alone is consuming sulphur at the rate of approximately 4.5 million tons annually while it is producing at the rate of approximately 5 million tons, including not more than 200,000 tons recovered as a by-product from sour gas. The result is that the United States is unable to supply all the overseas demand in addition to that of this continent.

An immediate solution to furnishing all the sulphur required by North America might be to shut off all overseas exports. However, this ready answer to the problem is not practical. Under the Marshall Plan this country is committed to a policy of assisting various countries overseas, particularly those which suffered great damage during World War II. Their industries have expanded along the same lines as our own, that is, in increased sulphuric acid production, and in the manufacture of rayon, insecticides, steel, and all the other myriad items made through chemical processes.

Another solution of the problem would be to increase sulphur production. This unfortunately takes time and in spite of diligent prospecting by sulphur companies and by oil companies in their drillings, new sizeable beds have not been discovered in the last 10 to 15 years. The *Fertilizer News* of last week carried a more complete analysis of the situation.

At the moment it cannot be determined how much sulphur will be obtainable for the manufacture of sulphuric acid for superphosphate production. Unless exports are further curtailed, it seems certain that there will be a reduction of from 10 to 20 per cent in the amount of sulphur that can be furnished to domestic sulphuric acid plants. The possible 20 per cent shortage probably will be reduced in direct proportion to any decrease in exports.

Were it not for the sulphur uncertainty and other possible repercussions from the present emergency, it seems assured that all three of the primary plant foods could be obtainable in sufficient quantities to meet all our needs. Barring these unknowns, it appears that some 15 per cent more nitrogen, at least 10 per cent more phosphoric acid and some 15 per cent more potash than was used last year could be produced this present

(*Continued on page 22*)

Reverted Phosphate Makes Spontaneous Return to the Mobile State in the Soil[1]

By G. Barbier, J. Chabannes, and M. Dirroux[2]

What fertilizing value does reverted or fixed phosphoric acid have in a soil? The older teaching has been that phosphoric acid becomes fixed in an acid soil by its reaction with iron and aluminum ions and as a consequence will have little if any fertilizing value. Recent investigations both in this country and abroad are tending to change the old concept of "fixation" meaning unavailability. The following report from France is one of several on this subject which have appeared in soil science journals in support of the fertilizing value of reverted phosphates.

V. Sauchelli

When a soluble phosphate has been incorporated into a humid soil, the amount of phosphoric acid that can be extracted from it by means of a suitable solvent, as for example a dilute acid, decreases bit by bit with time, but as a general rule it does not tend toward zero: a fraction of the incorporated phosphate remains indefinitely in an extractable form. This fact suggests that the evolution of soil phosphates, sometimes called reversion, is limited by an inverse reaction and that an equilibrium is established between the forms which can be extracted and the forms which cannot be extracted. We shall show in this paper that the so-called reverted fraction of the applied fertilizer is susceptible of progressively reforming the extractable portion in proportion as the latter is depleted.

In the same manner, the fixation of potash into a non-exchangeable form is also limited; certain workers consider that an equilibrium becomes established in the soil between the exchangeable and the non-exchangeable forms. We confirm that the fixation of the potash in the soil does not necessarily end in a definite immobilization of the potassic ion, and that if one removes the exchangeable potassium it can re-form at the expense of that which has temporarily become fixed.

The authors explain how they laid out the experiment begun in 1928 by A. Demolon and H. Burgevin at the Central Agronomy Station. Each plot received every year between 1928 and 1941 a constant application of a simple fertilizer, be it 1000 kg. of superphosphate or of basic slag per hectare per year, or 250 kg. K_2O as muriate or sulphate of potash. No applications were made in 1942 and 1943, but they were made subsequently. The soil remained fallow, but received the normal cultural practices. Soil is clayey—15% clay (2μ)—lightly humic (organic matter at beginning of tests, 3.9%) deficient in lime and slightly acid, *p*H 6.3 in 1928.

Phosphoric Acid

Progress and limit of the evolution of phosphates in the course of time.

As previously pointed out (Ann. Agron. 4e trimester, 1944), the soil samples taken each fall before applying the fertilizer and preserved in the laboratory after having been air-dried, were treated at the same time by diverse weak chemical reagents (such as dilute acids, citrate of ammonia). We observed that the quantity of P_2O_5 extracted by each of these reagents increases with the thousandth of the soil sample, therefore, with the quantity of P_2O_5 incorporated, but less rapidly than it. The graphs show a convex ascending branch of the curve which seems to tend toward an ascending right.

The first application of phosphates produces a certain increase of extractable P_2O_5; the second an increase apparently much smaller, because the first has remained a year longer in the soil and its solubility has diminished, and so it continues up to the point at which the first applied dosage has ended its evolutionary process. Table 1 shows schematically what takes place:

TABLE 1

Year	*Total Stock of P_2O_5*	*P_2O_5 Extractable*
Prior to test	R	E
1929.....	R + a	E + e_1
1930.....	R + 2a	E + e_1 + e_2
1931.....	R + 3a	E + e_1 + e_2 + e_3
:		
:		
:	R + na	E + e_1 + e_2 + e_3 - + e_n

e_1—for each soil sample, whatever may be its rank, the quantity of extractable P_2O_5 coming from the precedent application, which has remained in the soil only one year;

e_2—that derived from the anterior dose which has been in the soil 2 years; etc. From each sample to the succeeding one, the increase of P_2O_5 which is extractable;

e_n—corresponds to the effect of the first application after n years.

If that term tended toward zero, the curve should tend toward the horizontal. If it tends toward a value above zero, the curve should tend to ascend toward the right.

The experimental results (*loco citato*) well support this second alternative and indicate in consequence that the extractable fraction of P_2O_5 incorporated does not become zero. It is otherwise difficult to conceive that it could be anything else, because then, in the check sample which does not receive any phosphatic fertilizer, the amount of extractable P_2O_5 should go on diminishing, which is not the case; it remains, on the contrary, perfectly stable.

The limit value of the extractable P_2O_5 fraction applied appears to be about 7 per cent for superphosphate and 15 per cent for the slag when 2 per cent acetic acid was used (12 gm. of soil + 60 cc. of reagent, with one hour's agitation).

(*Continued on page 26*)

[1]Translated by Vincent Sauchelli, The Davison Chemical Corporation, Baltimore, Maryland.

[2]Central Agronomy Station, Versailles, France, Published in Annales Agronomiques, 1948, pp. 521-527.

Seay Joins Phillips Houston Sales Office

The appointment of M. D. Seay as assistant manager of the Houston district of Phillips Chemical Company's fertilizer sales division has been announced by K. S. Adams, president of Phillips Chemical Company and its parent organization, Phillips Petroleum Company.

M. D. Seay

Mr. Seay, a native of Madisonville, Texas, attended Angleton High School and graduated from Texas A. and M. College in 1939 with a B.S. degree in agricultural education. Following graduation and prior to joining Phillips he made an outstanding record as a F. F. A. and taught vocational agriculture for 11 years at Seagoville and Mesquite, Texas.

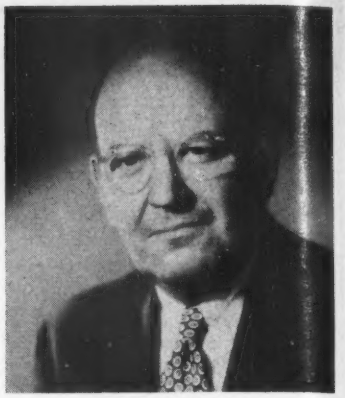
The Hosuton district office of the fertilizer sales division is in the Commerce Building Addition.

Davison Appoints DeVinny Industrial Relations Head

H. B. DeVinny has been appointed Director of Industrial Relations of the Davison Chemical Corporation, Baltimore, Maryland, effective November 1, 1950 succeeding W. N. Watmough, Jr., who was elected a vice president.

Mr. DeVinny began his business career with the Firestone Tire and Rubber Company in 1923 as a Sales Trainee, and later served as a District Manager. Since joining Davidson in 1941, he has held various executive and administrative positions in personnel, production and industrial relations.

He was succeeded by Russell E. Marks as Assistant Director.



H. B. DeVinny

NOVEMBER CROP REPORT

Estimate of Crops by the Crop Reporting Board, U. S. Department of Agriculture, as of November 1, 1950

Crop	Total Productions (in thousands) 1949	Preliminary 1950
Corn, all, bu.	3,377,790	3,105,436
Wheat, all, bu.	1,146,463	1,010,069
Winter	901,668	740,537
All spring	244,795	269,532
Durum	38,864	33,457
Other spring	205,931	236,075
Oats, bu.	1,322,924	1,483,975
Barley, bu.	238,104	299,954
Rye, bu.	18,697	22,509
Buckwheat, bu.	5,184	4,740
Flaxseed, bu.	43,664	35,224
Rice, 100 lb. bag	40,113	38,022
Sorghum grain, bu.	152,630	196,344
Cotton, bales	16,128	9,945
Hay, all, tons	99,305	107,870
Hay, wild, tons	12,296	12,657
Hay, alfalfa, tons	38,546	41,702
Hay, clover and timothy, tons	24,657	29,395
Hay, lespedeza, tons	8,571	7,987
Beans, dry edible, 100 lb. bag	21,554	16,419
Peas, dry field, 100 lb.	3,267	2,902

Crop	Total Production (in thousands) 1949	Preliminary 1950
Soybeans for beans, bu.	222,305	281,133
Peanuts, lbs.	1,875,825	1,771,320
Potatoes, bu.	401,962	430,591
Sweet potatoes, bu.	54,232	59,491
Tobacco, lbs.	1,970,376	2,013,165
Sorgo sirup, gals.	6,012	6,226
Sugar cane for sugar and seed, tons	6,796	7,260
Sugar cane sirup, gals.	11,770	9,795
Sugar beets, tons.	10,197	13,549
Broom corn, tons	44	26
Hops, lbs.	50,730	58,288
Apples, com'l crop, bu.	133,742	120,499
Peaches, bu.	74,818	52,407
Pears, bu.	36,404	30,804
Grapes, tons	2,662	2,539
Cherries (12 states), tons	250	231
Apricots (3 states), ton.	198	198
Cranberries (5 states), bbl.	840	968
Pecans, lbs.	128,174	110,688

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NEW YORK

Sulphate of Ammonia Shipments Tend to Slow Up. Advance in Ammonium Nitrate Price Expected. Better Interest in Fertilizer Organics. Shortage of Superphosphate in South

NEW YORK, November 22, 1950

Sulphate of Ammonia

In some quarters it was rumored that material was not moving too well against existing contracts and that some buyers were inclined to hold back ordering the material into their plants. Synthetic producers were sold out for nearby shipment.

Nitrate of Soda

This material was quiet and a routine affair with no price changes noted.

Ammonium Nitrate

It is expected this material will advance about $5.00 per ton about January 1st. Most producers are behind on deliveries and it is difficult to secure material if wanted for quick shipment.

Nitrogenous Tankage

One large domestic producer recently raised the price of this material on contracts 25 cents per unit of ammonia (30 cents per unit N). It is still difficult to locate material for prompt shipment. Practically all domestic producers are sold ahead and are out of the market.

Castor Pomace

One producer was offered material at $37.50 per ton while another producer quoted $5.50 per unit of ammonia ($6.68 per unit N), f.o.b. production points. Additional sales were made on this basis.

Organics

Buyers showed further interest in organic fertilizer materials and most markets remained firm. Tankage and blood were sold at $8.50 per unit of ammonia ($10.33 per unit N), f.o.b. Eastern shipping points, and feed buyers were said to have paid even higher prices due to the increasing feed demand with the advent of colder weather in various parts of the country. Soybean meal advanced sharply to $61.00 per ton in bulk, f.o.b. Decatur, Ill., and linseed meal sold at $64.00 per ton in bulk, f.o.b. Eastern points. Cottonseed meal was firm at $73.00 per ton, f.o.b. Memphis, Tenn. with some other production points asking even higher prices.

Fish Meal

Imported fish meal continued to arrive at various ports along the Atlantic Coast and demand in general was rather slow. Menhaden fish meal 60 per cent was quoted at $130.00 per ton, f.o.b. fish factories and some scrap was offered from the Gulf Coast at $117.00 per ton, f.o.b. fish factory.

Bone Meal

Demand is fairly good from both the fertilizer and feed trade and some producers have withdrawn from the market. Imported material continues to enter the country at various Atlantic ports.

Hoof Meal

Renewed buying has placed this material in a firm position with little being offered for nearby shipment and last sales made at $7.50 per unit of ammonia ($9.12 per unit N), f.o.b. Chicago.

Superphosphate

Reports were current that some shortages exist for this material at various Southern points. Movement in the North, however, was said to be slow at the present time although producer's costs are constantly increasing. Triple superphosphate remains in a very firm position with no material being offered.

Potash

Foreign muriate of potash is expected shortly at several Atlantic ports and some sulphate of potash recently arrived from abroad. This material is being sold at approximately the same price as domestic material on the Atlantic Coast.

PHILADELPHIA

Supply Position Becoming Tighter. Sulphuric Acid Shortage Being Felt. Triple Super in Big Demand.

PHILADELPHIA, November 22, 1950

The general supply position is becoming gradually tighter with the possible exception of nitrate of soda and the packing-house products. Sulphuric acid is exceedingly scarce and this shortage is bound to affect the production of sulphate of ammonia and superphosphate.

Sulphate of Ammonia.—Production of coke-oven grade is well under contract for the 1950–1951 season and while no extreme shortage has as yet developed, the position is beginning to tighten. Synthetic is very scarce and production has been set back due to sulphuric acid shortage.

Ammonium Nitrate.—The supply position continues exceedingly tight and a price advance of $5.00 per ton is scheduled for January 1.

Nitrate of Soda.—Prices hold firm, with normal seasonal demand, and ample supplies to meet requirements.

Blood, Tankage, Bone.—No unusual activity is displayed in these packing-house products. Price range remains at $8.25 to $8.75 per unit of ammonia ($10.02 to $10.63

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per unit N) for blood and tankage, with bone meal at $60.00 to $62.50 per ton.

Castor Pomace.—Production is fully under contract and nothing is being offered now.

Fish Scrap.—Market continues quiet with limited offerings of scrap reported at $115.00 to $120.00 per ton. Menhaden meal is quoted nominally at $130.00 per ton.

Phosphate Rock. — Domestic movement is principally against contracts, but the scarcity of sulphuric acid is expected to cut down the demand. Export inquiry is reported active.

Superphosphate.—There is no easement in the supply position of the triple grade, and the demand for normal is increasing beyond production, due to increasing tight acid supply position.

Potash. — Domestic production continues at capacity with deliveries about up to schedule. There are brief periods of interruption due to car shortage, but this shortage as a whole has not been too bad. Production is practically all under contract.

CHARLESTON

Sulphuric Acid Shortage Has Acidulators and Mixers Worried. Nitrogen and Potash Seem Adequate.

CHARLESTON, November 20, 1950

The situation on superphosphate has developed to the point of where there are no surplus supplies in the southeast and midwest, and some mixers in these areas are considerably worried as to the available supplies for the season. Nitrogen and potash continue adequate and in firm market position.

Organics.—The market continues relatively quiet and except for a few organics such as castor pomace, tung meal, and imported types, very little is being offered. The domestic producers of nitrogenous tankage are sold up for the season and prices are nominally $4.35 to $4.50 per unit of ammonia ($5.29 to $5.47 per unit N) in bulk, f.o.b. production points. Blood and packing house tankage continues at levels too high for most fertilizer manufacturers.

Castor Pomace.—Some supplies are available for fall shipment at $5.50 per unit of of ammonia ($6.68 per unit N) in bags, f.o.b. northeastern production points. This material is guaranteed 5.57 per cent minimum ammonium content.

Dried Ground Blood.—The New York market is around $9.00 to $9.50 per unit of ammonia ($10.94 to $11.55 per unit N) in bulk, and Chicago $9.00 to $9.25 ($10.94 to $11.24 per unit N). The market is rather quiet.

Potash.—Production continues at high levels and movements to consumers steady, except for temporary interruptions caused by car shortages. Demand continues slightly in excess of supply. Prices are firm.

Ground Cotton Bur Ash.—A limited quantity is offered from the Texas area, spring shipment, but the available supplies for the new season are estimated at slightly less than half of shipments last season, due to a poor cotton crop in Texas.

Phosphate Rock. — Although movement to domestic acidulators is fairly steady, it is expected that shipments may have to be curtailed for lack of sufficient supplies of sulphuric acid. Sulphuric acid has tightened considerably in supply recently, and is expected to remain short for the near future.

Superphosphate.—This market has strengthened to the point of being quite tight, resulting in movement of surplus supplies to areas where it is short. Many of these movements have been on long freights which are not normal. The dislocation of supply and demand has been caused by shortages and increased costs of sulphuric acid. Prices are firm and tending upward.

Sulphate of Ammonia.—Demand continues relatively steady but coke-oven stocks are tending to increase temporarily. Prices remain firm and synthetic production has been curtailed for lack of sulphuric acid.

Ammonium Nitrate.—This source of mineral nitrogen continues short of demand and recently one of the

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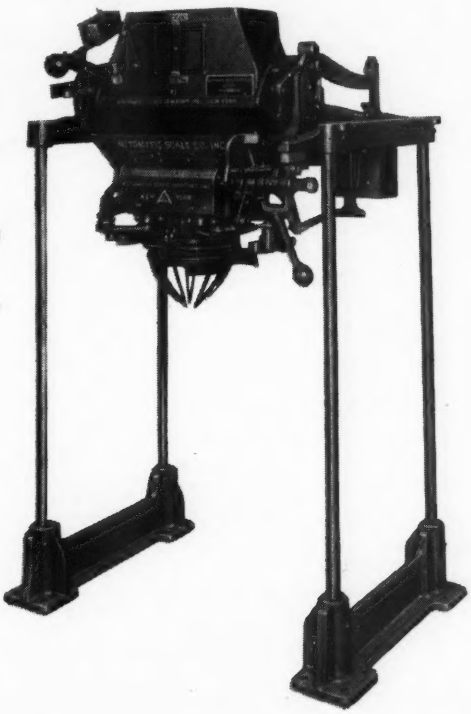

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domestic producers has announced increase of $5.00 per ton to become effective January 1st.

Nitrate of Soda.—Supplies continue adequate and demand in seasonal dimension. No change in price has been noticed.

CHICAGO

Improvement Shown in Animal Ammoniates Market but with Little Future Buying.

CHICAGO, November 20, 1950

A further slight improvement in the market on animal ammoniates developed during the past two weeks and at present the market appears to be in a firm position, although actual trading has not been on a very broad scale. However, buying interest has been very steady and producers have not found it difficult to keep their production moving, although there has not been any demand for material for future shipment. If this balance between production and disappearance is maintained, it is anticipated that the market will remain firmly steady

List prices were advanced $5.00 per ton during the current week and ground and sacked meat scraps, 50 per cent protein, are now listed at $110.00 to $115.00 per ton. Digester tankage, 60 per cent protein in bags, is listed at $115.00 to $120.00 per ton. Dry rendered tankage is generally held at $2.00 per unit of protein with buyer's views 5 cents to 10 cents lower. However, in most cases the asking price prevails. Wet rendered tankage is generally held at $9.25 to $9.50 per unit of ammonia ($11.24 to $11.55 per unit N), but buyer's interest is held at $8.75 to $9.00 ($10.63 to $10.94 per unit N). Because of this difference trading is small. Dried blood is wanted at $9.00 per unit of ammonia ($10.94 per unit N) delivered and sellers are asking $9.25 ($11.24 per unit N) or higher. Steamed bone meal, 65 per cent B.P.L., bagged is listed at $75.00 to $80.00 per ton and raw bone meal, 4½–45 per cent, at $70.00 to $75.00 per ton.

Cotton Crop Figures

A 1950 cotton crop of 9,945,000 bales is forecast by the U. S. Crop Reporting Board based on information as of November 1. Improved production prospects in most States west of the Mississippi River more than offset decreases in eastern areas. This resulted in a gain over the October forecast of 76,000 bales, or nearly 1 per cent. Production in 1949 was 16,128,000 and the 1939-48 average, 11,599,000 bales.

Lint yield per acre for the United States, computed at 259 pounds, is 25 pounds below last year's yield and 2 pounds below the 10-year average. In Arizona, a record high yield per acre is indicated while in California the prospective yield is the second highest of record. The indicated yield per acre is above average in Florida, Texas and New Mexico. In all other cotton States yields are moderately to sharply below average with near low yields in some areas.

The Bureau of the Census reports 6,458,708 bales ginned from the crop of 1950 prior to November 1, compared with 9,540,328 bales for 1949 and 10,436,740 bales for 1948.

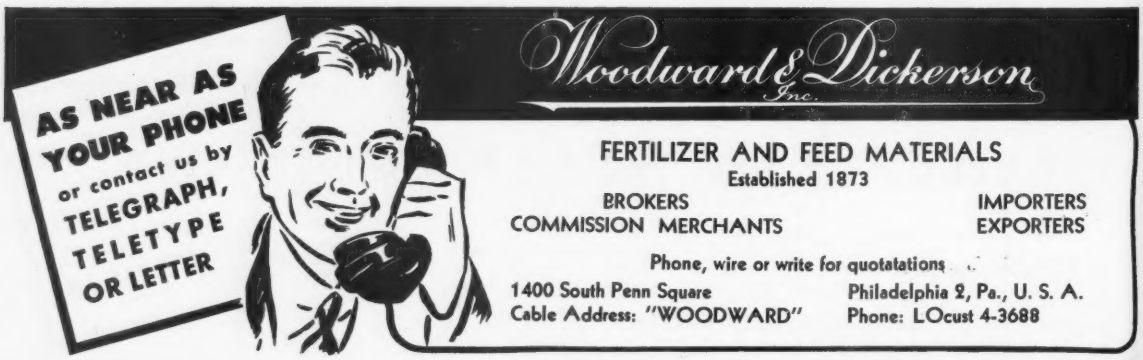
Production (Ginnings) 500-lb. gross wt. bales

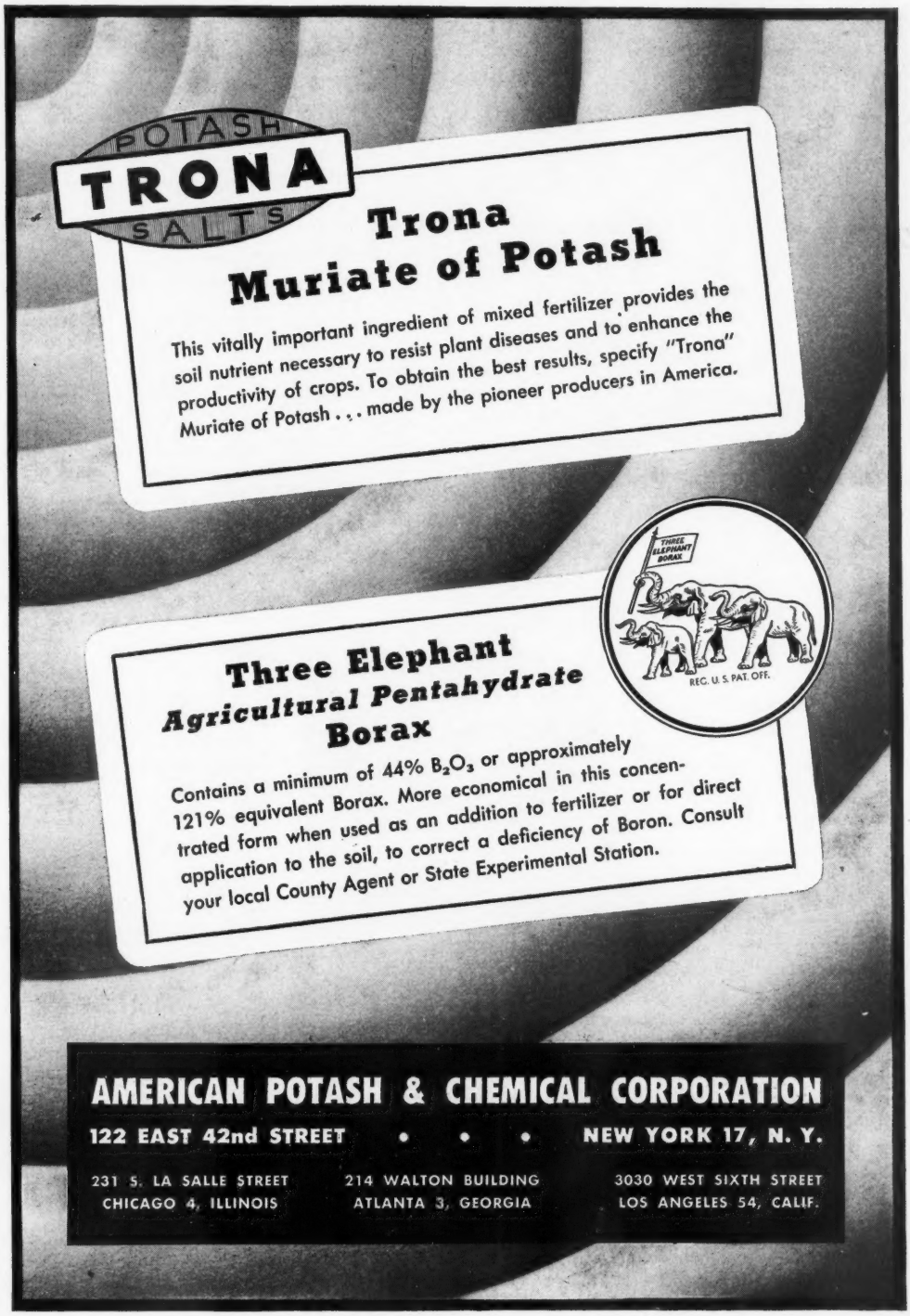
State	1949 Crop	1950 Crop Indic. Nov. 1
	Thousand bales	*Thousand bales*
Missouri	462	270
Virginia	20	5
North Carolina	466	170
South Carolina	554	410
Georgia	604	510
Florida	16	14
Tennessee	633	425
Alabama	852	580
Mississippi	1,487	1,340
Arkansas	1,632	1,105
Louisiana	650	430
Oklahoma	610	225
Texas	6,040	2,950
New Mexico	276	195
Arizona	543	428
California	1,268	880
Other States	15	8
United States	16,128	9,945

Brandt Named Technical Director by Davison

Appointment of L. H. Brandt as Director of Technical Service of the Industrial Chemicals Division of The Davison Chemical Corporation, is announced by R. D. Goodall, General Sales Manager of the division. Mr. Brandt attended Denison University and the Ohio State University where he received his bachelor's degree in chemical engineering in 1929 and the professional degree of Chemical Engineer in 1938.

He was formerly connected with the technical service departments of E. I. du Pont de Nemours & Co., of Wilmington and the Pennsylvania Salt Manufacturing Company of Philadelphia.

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Indian Fertilizer Production Increased

Fertilizer production in India has progressively increased during the last four years. Six plants are manufacturing ammonium sulphate and turned out 46,000 tons in 1949. A state-owned ammonium sulphate factory with an annual production capacity of 350,000 tons will shortly go into operation at Sindri (Bihar) and will reach full production by the end of 1951. The present consumption of ammonium sulphate is 280,000 tons.

Fourteen plants with a total capacity of 150,000 tons are producing phosphatic fertilizers. Domestic requirements for the next two years are estimated at about 200,000 tons.

Tobacco By-Products Promotes Hatcher and Crigler

Tobacco By-Products and Chemical Corporation announces the appointment of Richard F. Hatcher as Southern Division Manager in

R. F. Hatcher

charge of their Montgomery, Alabama, office, where the 65-year-old firm specializes in cotton insecticides. Also announced was the appointment of J. L. Crigler as Assistant Manager.

Mr. Hatcher, a native of Winchester, Virginia, has been associated with the firm for 17 years and until recently, was District Sales Manager of the southern territory. He is a graduate of the Virginia Polytechnic Institute, where he received his B.S. Degree in l culture and the Masters Degre entomology. He is a member o American Association of Eco Entomologists.

Mr. Crigler, who has been Sales Division of the corpora for the past 7 years, is a native o Starkville, Mississippi, and holds a B.S. Degree in Business Administration from Mississippi State College.

Both men will be located in Montgomery, site of the firm's general insecticide plant which specializes in insecticides for cotton, peanut, vegetable, and fruit crops of the South.

NFA Fall Meeting

(Continued from page 8)

out regret, but some conditioners are needed to insure delivery of fertilizers in satisfactory physical condition. Some states require by law that only non-acid-forming mixtures be sold. The requirement can be met by the additions of dolomite but, here again, there is no room in high-analysis mixtures.

Turning to the problems of the manufacturer, Miller said that high-analysis fertilizers pose the problem of segregation. Present sampling methods of most states do not take segregation into account and a mixture may be found deficient even though it has more than the required amounts of each element in the bag. Segregation can be overcome by granulation but this calls for highly specialized, costly equipment that many small mixers could not afford.

High analysis fertilizers cost the consumer more per ton, they have to be spread more thinly thus calling for more accurate application equipment, and, because of lack of conditioners, they are more difficult to store on the farm. Miller also stated that the occurrence of minor-elements as impurities in superphosphates cannot be ignored. Their importance to healthy crop-growth is now more keenly appreciated and the less-highly-purified superphosphates certainly contain them.

In order to get consumer acceptance, a big educational job may be required to overcome pres-

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ent tendencies and get farmers and dealers to think of fertilizers according to their plant food content rather than by the ton.

Miller also used some principles of economics to support his arguments, as had Lockwood a few minutes earlier. Miller's argument went this way: If lower analysis fertilizers continue to be used widely they can continue to be made by small manufacturers as they do not require costly machinery that can be purchased by only a few large firms. Made, as they are now, by a large number of small plants serving relatively small areas, less shipping will be needed.

"Factors Influencing Consumer Acceptance" were discussed by Mr. Dunton who saw the problem as one that will respond to general principles. Dunton suggested that a three-phase program be adopted. The first phase he called the "Analysis" or "Research" stage in which it is decided if the program is really desirable. This often takes years, and involves, he said, "selling ourselves on the idea before we try to sell it to others."

The second step Dunton termed the "Demonstration" phase. This calls for teaming together of industry, state officials and farmers. Dunton cited the successful pasture program recently carried out in Virginia which was brought to the attention of the fertilizer industry 2 years ago. During the demonstration phase of that program, each county in Virginia had from one to three pasture demonstrations. At this stage, everyone who is interested in promoting the cause should be encouraged. This can be done, he said, by giving each interested person something specific to do and then giving them credit for their efforts.

Mass participation, the last phase of the program, is predicated on the success of the first two stages, Dunton said, and timing is important. All interested groups should be enlisted and given due recognition. By frequent, continued mention in the local press and on the radio, and by wide general interest among his friends, the ultimate consumer will soon be doing what you want him to do, Dunton concluded.

Open Discussion

Following the panel there was a brief open forum with considerable participation from the floor, members of the audience were provided with a microphone so their questions and comments could be heard. In response to the question, "What can the manufacturer do to increase consumer acceptance of high-analysis fertilizers?" the panel's moderator, Mr. Fudge, replied, "Sell plant food, not fertilizer. Have a sales service, not a sales force. "Turning to the members of the panel, he asked "Isn't that about it, gentlemen?" They nodded their agreement.

Comments from the floor brought out a need for sulphur in certain sections and data were cited showing increased cotton yields as a result of the use of gypsum.

The practice of liming fields to eliminate the use of lime as a conditioner was discussed and reference was also made to the use of dolomite for overcoming magnesium deficiencies and as a source of calcium.

With the close of the forum, the convention, held for the first time out of Atlanta, was officially over. As the NFA group moved out, another convention began to crowd noisily into the hotel's rooms and corridors. Looking askance at the newcomers, one pert little Southern belle employed by the hotel said, "I'll take the fertilizer folks, anyday." We felt the same way, ourself.

Industry Responsibility

(Continued from page 12)

fertilizer year. I think these amounts of nitrogen and potash will be produced. In my opinion no one at this time can make any accurate predictions as to the actual amounts that will be forthcoming for agricultural use. We all know that Defense will have the first call on nitrogen should the plants still under Government operation be unable to produce defense needs. Sulphur is also a defense must and any unusual use may well still further affect sulphuric acid supplies for superphosphate. No immediate effect on potash appears but transportation and labor are all important here—even more so than in the case of nitrogen and phosphoric acid. The picture is not at all clear but it is disturbing.

Delivery Problems

Another danger spot is delivery from factory to farm. While we have abundant manufacturing capacity to meet every likely demand, we must remember that our ability to store our production has not been expanded to anywhere near the increase of consumption which has more than doubled in the past ten years. To meet such a demand our superphosphate and mixed goods storages must be regularly emptied and refilled. Our customers must be persuaded to take early deliveries and store their needs on their own farms. In addition, transportation equipment and facilities are not available to move all this fertilizer promptly on a planting-season peak basis.

Under the President's order, the Department of Commerce is charged in the emergency with supervision over the raw materials of our industry, the Department of Agriculture is charged with the control and distribution of ready-for-use

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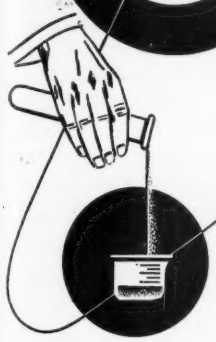

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fertilizer, and the Department of the Interior with power and fuel. No allocations of materials and no restrictions on manufacture or distribution of fertilizers have so far been made.

The authorities are wisely preparing plans for whatever action may later become necessary. Industry advisory committees are being lined up, and in some industries, including our own, certain individuals have been approached for service in Washington with some one of these agencies should the situation become more acute.

We are living in a critical time when our very existence as a Nation may be at stake. Let me urge, that should any of you be called for such a service, you make such personal and business sacrifices as may be necessary to serve your industry and your country for the common good. Only by having industry men who know the answers on duty with the Government, can the best results be accomplished.

Certain new departures in fertilizer manufacture and distribution merit mention, though perhaps too early to evaluate. An attitude of stop, look, and listen, seems advisable. A number of self-propelled machines have recently been placed on the market for the purpose of applying limestone, phosphate rock, and mixed fertilizers broadcast to the soil. Some of them are designed to accurately apply even as small tonnages as 100 pounds per acre. This is extremely important for the application of mixed fertilizers to pastures and haylands, and perhaps to top dressing of small grains. Row crops will require more consideration. Some fertilizer companies are contracting to apply mixed fertilizers to the farmer's soil with such machines. State Fertilizer Control Officials are much concerned over the sampling and record complications of such practices under present State laws. Time will tell.

Fertilizing by Plane

Airplane distribution of fertilizers is likewise under extensive trial. Certain non-row crops need fertilization at times when the condition of the soil makes ordinary machine application difficult. Spring top dressing of small grains and rice are notable examples, as are grazing areas of rough terrain. Such applications of poisons for insect control and selective weedicides are proving most effective. There may be an excellent future as to fertilizer.

Some effort has been made to introduce certain insecticides and weedicides into fertilizer mixtures in order to make only one application necessary. Many agronomists and soil scientists urge extreme caution as to such practices. Too little is known yet as to the interreaction of such mixtures and particularly as to their residual effect. Any bad results from such mixtures may cause the blame to be thrown improperly against the fertilizer.

These few brief facts show that time has brought increasing responsibilities on our industry. To keep abreast of the times to come will call for a continuation of a strong and effective trade association and for continued cooperation between members of our industry and those in allied fields.

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Reverted Phosphate

(Continued from page 13)

Regeneration of Extractable P_2O_5

We shall now consider the behavior of the so-called reverted P_2O_5 (actually what is meant is non-extractable P_2O_5) and shall show that all of this fraction can be caused to go into solution by desorption (which is to say, without destroying the mineral "fixing agents").

(1) A small amount of soil (5 gm.) from the superphosphated portion (of the year 1943, therefore after an average aging of about 10 years) and from the check plot without phosphate was spread in a thin layer upon a filtrating plaque, then leached rapidly under vacuum, first by an 0.002 N H_2SO_4 solution, until the phosphorus in the filtrate had almost disappeared, which requires about 300 cc. to 400 cc. of the solution; the difference in the quantities of P_2O_5 released by the two soils represents about a third of the amount incorporated. Then the two soils were leached with a solution of 0.002 N KOH (with a small amount of KCL to maintain the soils flocculant). The same soil having fixed recently a same amount of P_2O_5 from monocalcic phosphate (0.57 p. p. 1000 of soil) was treated in the same manner (Table 2).

Aging of phosphates in the soil results essentially in the transformation of the readily extractable phosphates by dilute weak acids into phosphates readily extractable by dilute alkalis. The fraction of the aged phosphates released (79 per cent) does not represent a limit, because at the end of the acid extractions as of the alkaline extractions, the phosphated soil continues to give up more P_2O_5 than the check soil (twice as much). These facts prove that the phosphatic ions have remained mobile and that they have not penetrated deeply into the lattice of the mineral fixing agents since they have remained quickly extractable by reagents which have not appreciably altered the structure of these minerals.

(2) The preceding experiment was repeated by replacing the alkali with a very dilute milk of lime which was added in just the right amount to neutralize the soil. After a time, the soil was again leached with dilute sulphuric acid. In parallel fashion another portion of the soil was treated with the dilute acid only. Results given in Table 3.

The re-liming of the soil did not cause an appreciable amount of P_2O_5 to go into the solution, but it did provoke an internal transformation, inverse to reversion, which favored the last extraction by means of dilute acid, and this to a much higher degree than that remaining in contact with the dilute acids themselves. We have otherwise noted that this re-liming effect increases with the *p*H of the medium and with the period of rest allowed before the second acid leaching.

Moreover, under certain experimental conditions the neutralization of the soil with the milk of lime, following a previous depletion by a dilute acid, suffices to bring about an appreciable release into solution of the P_2O_5 (up to 0.12 pts. per 1000 of soil, or say 21 per cent of the amount introduced). It is this which occurs when by agitation in the presence of a solution of milk of lime a partial deflocculation of the soil takes place.

(3) The superphosphated soil and the check sample were subjected alternately to extractions by means of 0.002 N H_2SO_4 and by dilute milk of lime solution. After 8 of these combined treatments, which lasted in all 8 days, during which the soil remained constantly at the neutral calcic point, except for the short intervals of time necessitated by the acid extractions, the difference in the quantities of P_2O_5 released by the two soils represented 86 per cent of the amount incorporated, and as stated previously, that by no means represents a limit. A later leaching with dilute KOH brought the amount recovered to 96 per cent.

(Continued on page 28)

TABLE 2

	P_2O_5 passed in solution p. 1000 parts of soil			*P_2O_5 recovered % incorporated by diff. with check*	
	Phosphate aged 10 yrs.	*Phosphate recently fixed*	*Check soil*	*Phosphate aged 10 yrs.*	*Phosphate recently fixed*
Extractions acid (400 cc.)	0.314	0.580	0.101	37	84
Extractions alkaline (150 cc.)	0.298	0.084	0.060	42	4
Total				79	88

TABLE 3

SUPERPHOSPHATED SOIL (1943, 10 YRS. OF AGING) P_2O_5 RELEASED IN SOLUTION (P. P. 1000 OF SOIL)

Extractions altering with 0.002 N H_2SO_4 and Ca $(OH)_2$	*P_2O_5 per 1000 parts of soil*	*Extraction by 0.002 N H_2SO_4 only*	*P_2O_5 parts per 1000 soil*
300 cc. H_2SO_4	0.290	300 cc. H_2SO_4	0.296
75 cc. $Ca(OH)_2$ (neutral)	0.009	75 cc. H_2SO_4	0.016
After one-half hour, 100 cc. H_2SO_4	0.059	100 cc. H_2SO_4	0.020

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Summary

The almost total amount of soluble phosphates incorporated in the soil under study, a common loam type, remained after a period of 10 years either in a form quickly extractable by dilute acids or one capable of regenerating spontaneously, under natural conditions, to the extractable form.

The authors have previously shown that the first form comprises a linkage of phosphoric ions with exchangeable cations located on the surface of the clay, notably calcium, which combination represents a sort of absorption phenomenon. It is conceivable that the phosphates thus held by the clay can pass back and forth in solution in the presence of the dilute acids which detach the exchangeable cations. The second form seems to comprise a liaison of phosphoric ions with nonexchangeable cations, notably iron (Fe) whose hydroxides strongly hold the phosphoric ions in an acid milieu, but which will release them in an alkaline milieu.

From the data presented one may concede that the slow evolution of phosphates in the soil consists essentially of a limited and reversible passage back and forth of the first form (calcic) to the second (ferric) form.

The authors have also shown (Annales Agron. 1944, p. 409) that in the soil in question the fertilizer action of the soluble phosphates does not decrease in the course of their aging, even during a period of 10 years. On the other hand, basic slags, in whose case the fraction remaining extractable by dilute acids is higher than for the superphosphate (owing to the fact that the slag brings the soil up to a calcium saturation level) have not shown, after 10 years, any effectiveness superior to that of the superphosphate. Consequently, the fraction of the phosphatic fertilizer considered as reverted because it is not actually extractable by a dilute acid, should not be considered as having a feeble fertilizer value in the type of soil studied.

References

Comptes Rendues Ac. Sc. t 226, 1948, pp. 749–751.

Comptes Rendues Ac. Sc. meeting of July 28, 1948.

Obituary

Frank G. Secord

Frank G. Secord, Cleveland manager of Swift & Co., Plant Food Division, died on November 7th, at the age of 62. He was associated with the Swift organization for forty-three years, and served as manager of the Cleveland division from 1924 until his death.

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Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

BAG MANUFACTURERS—Burlap
Bemis Bros. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Paper
Arkell & Smiths, Canajoharie, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
International Paper Co., Bagpak Div., New York City
Jaite Company, The, Jaite, Ohio
Kraft Bag Corporation, New York City
Mente & Co., Inc., New Orleans, La.
Raymond Bag Co., Middletown, Ohio
St. Regis Paper Co., New York City
Virginia-Carolina Chemical Corp., Richmond, Va.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES
International Paper Co., Bagpak Div., New York City
St. Regis Paper Co., New York City

BAG PRINTING MACHINES
Schmutz Mfg., Louisville, Ky.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, The, East Point, Ga.
Automatic Scale Co., New York City
St. Regis Paper Co., New York City
Sackett & Sons Co., The A. J., Baltimore, Md.
Sturtevant Mill Company, Boston, Mass.

BONE PRODUCTS—Bone Black
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—For Hoists, Cranes, etc.
Hayward Company, The, New York City

BUCKETS—Elevator
Baughman Manufacturing Co., Jerseyville, Ill.
Link-Belt Company, Chicago, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

CARS AND CART
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

CASTOR POMACE
McIver & Son, Alex. M., Charleston, S. C.

CHEMICALS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Barrett Div., Allied Chemical & Dye Corp., New York City
Commercial Solvents Corp., New York City
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
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McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.
United States Steel Corp., New York City
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.
Woodward Iron Company, Woodward, Ala.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CONDITIONERS
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio
Quakers Oats Company, Chicago, Ill.
Summers Fertilizer Co., Baltimore, Md.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.

DRYERS
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.
Sturtevant Mill Company, Boston, Mass.
Titlestad Corporation, Nicolay, New York City

FERTILIZER (Mixed) MANUFACTURERS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago, Ill.
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Summers Fertilizer Co., Baltimore, Md.
Virginia-Carolina Chemical Corp., Richmond, Va.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
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McIver & Son, Alex. M., Charleston, S. C.
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HOPPERS
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LEAD BURNERS
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MACHINERY—Acid Making and Handling
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MACHINERY—Grinding and Pulverizing
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Bradley Pulverizer Co., Allentown, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
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Sturtevant Mill Company, Boston, Mass.

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Link-Belt Company, Chicago, Ill.
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MACHINERY—Mixing, Screening and Bagging
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International Minerals & Chemicals Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.

NITROGEN SOLUTIONS
Barrett Div., Allied Chemical & Dye Corp., New York City
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGENOUS ORGANIC MATERIAL
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Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Davidson Commission Co., The, Chicago, Ill.
International Minerals & Chemical Corporation, Chicago, Ill.
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Northern Chemical Industries, Inc., Searsport, Me.
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Monarch Mfg. Works, Philadelphia, Pa.

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Ashcraft-Wilkinson Co., Atlanta, Ga.
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Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago, Ill.
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Virginia-Carolina Chemical Corp., Richmond, Va.

PLANT CONSTRUCTION—Fertilizer and Acid
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Chemical Construction Corp., New York City
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Baker & Bro., H. J., New York City
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
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POTASH SALTS—Manufacturers
American Potash and Chemical Corp., New York City
Potash Co. of America, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
United States Potash Co., New York City

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Schmutz Mfg. Co., Louisville, Ky.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
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Stedman Foundry and Mach. Works, Aurora, Ind.

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Summers Fertilizer Co., Baltimore, Md.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

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International Minerals & Chemical Corporation, Chicago, Ill.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

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Ashcraft-Wilkinson Co., Atlanta, Ga.
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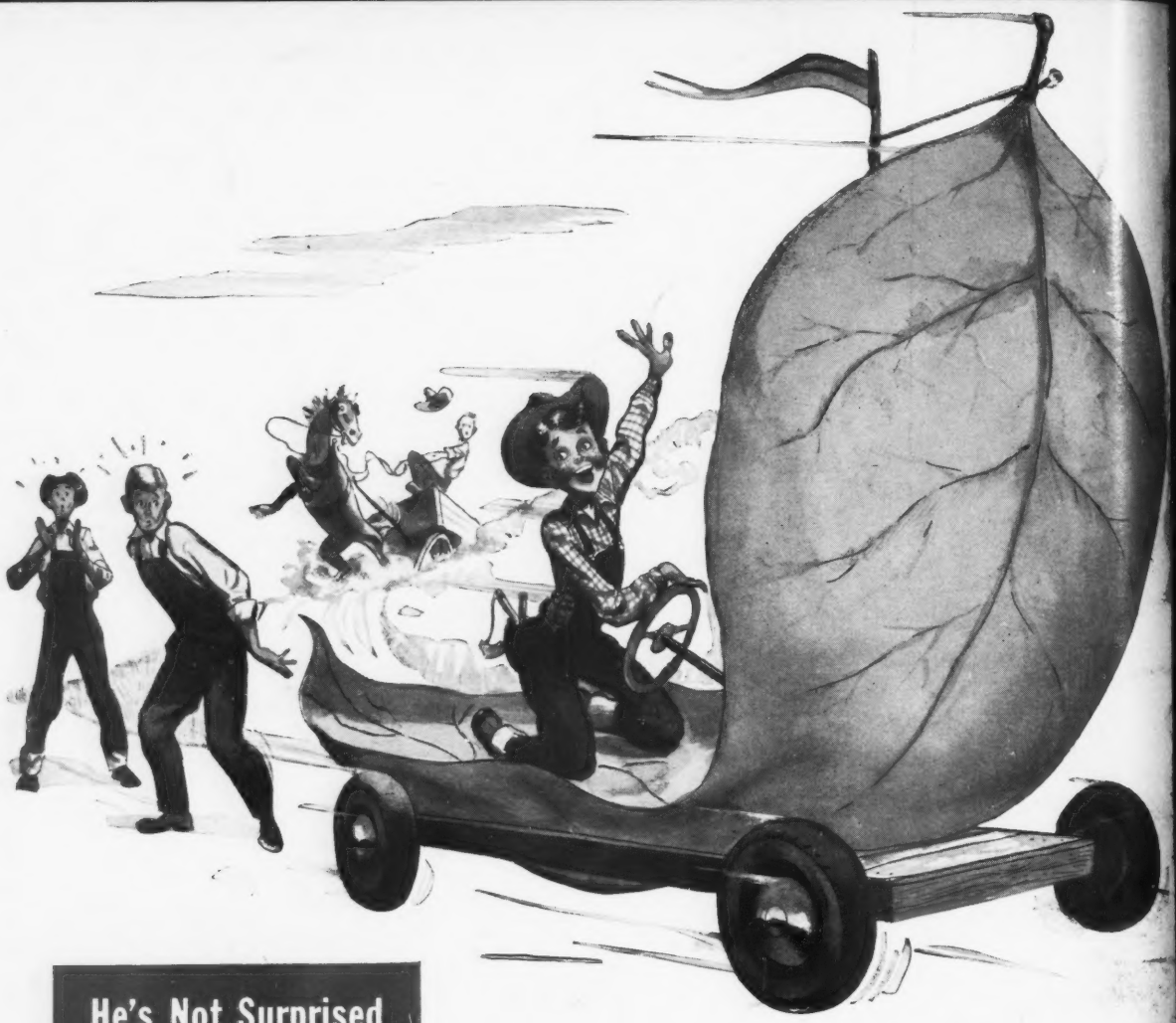

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